committee to promote the investigation of the marine zoology of the Yorkshire Coast; a micro-zoology and micro-botany committee; a committee to consider proposals for the legislative protection of wild birds' eggs; and a committee having for its object the investigation of the mycological flora of Yorkshire. Upon each of the committees we notice the names of numerous well-known scientific workers; and, as the committees co-operate, when possible, with British Association committees, the Union forms the connecting link between the local societies and the Association. This kind of organisation seems to be the one calculated to produce the greatest amount of useful work. While referring to natural history societies, we may mention that the West Kent Natural History, Microscopical, and Photographic Society has sent us their report for 1894-95. The report contains an address by the President, Mr. H. J. Adams, on "Colour Photography," and a paper on "The Birds of Blackheath," by Mr. H. F. Witherby.

H. MOISSAN has attempted to produce argon compounds by acting on argon, under various conditions, with some of the rarer elements which unite more or less readily with nitrogen (*Comptes rendus*, May 6). 100 c.c. of the new gas were placed at his disposal by Prof. Ramsay. In a part of this, titanium, boron, and lithium were strongly heated without apparent change. Similarly, uranium (containing 3½ per cent. of carbon) did not absorb an appreciable amount of the gas when heated with it for twenty minutes. A quantity of the gas was conducted into a platinum tube of special construction, and there exposed to the action of pure fluorine, both at the ordinary temperature and in presence of induction sparks; in neither case could any reaction be observed whatever the proportion of argon present. The difficulty of manipulating fluorine has not allowed of the effect of long-continued sparking being observed. The results were entirely negative; under the conditions of these experiments, no compounds of argon have been produced.

BY saturating an ethereal solution of ferric chloride with nitric oxide, and concentrating the product at the ordinary temperature in the vacuum desiccator, V. Thomas has succeeded in obtaining crystals of the composition $FeCl_2.NO.2H_2O$. (*Bull. Soc. Chim.* [3], xiii.-xiv. No. 8). The anhydrous compound may be obtained in smaller yellow crystals by crystallisation at 60° on a porcelain plate. Peligot found that nitric oxide dissolved in ferrous chloride solution in the proportion required to form a compound $2FeCl_2.NO$, and this solution lost all its gas on heating. It is interesting and significant that the new crystalline product dissolves completely in cold water without evolution of gas to form a pale yellow solution, and that the solid compound is quite stable in vacuo at the ordinary temperature. Of considerable interest also is the observation by the same author, that nitric oxide gives abundant crystalline precipitates when passed through solutions of antimony tribromide or antimony trichloride.

A NEW series of iron nitrosocompounds have been discovered, by K. A. Hofmann and O. F. Wiede, which possess interest both from the point of view of the gas-analyst and in consequence of the example they afford of the synthetical production of complex inorganic substances. A current of nitric oxide is passed through a concentrated solution of 200 grams ferrous sulphate and 300 grams of potassium thiosulphate. A compound is precipitated in red-brown leaflets, which has the composition $Fe(NO)_2S_2O_3K.H_2O$. This substance may be dried in the vacuum desiccator without change. It is difficultly soluble in water, and dissolves in concentrated sulphuric acid without decomposition, giving an intensely greenish yellow coloured solution. Ammonium and sodium salts of similar composition and properties have also been prepared. The formation of the new acid, dinitrosoferrothiosulphuric acid, of which these salts are derivatives, is facilitated by the presence of an excess of ferrous salt. It may be considered that the essential reaction in its formation consists of a replacement of the group (KS_2O_3) by NO in ferrous potassium thiosulphate, viewing the latter as $KO_3S_2.Fe.S_2O_3K$. The displaced radical probably forms potassium tetrathionate which does not react further. Cobalt compounds, in which the cobalt replaces the iron in this series, can be obtained, though with much greater difficulty. The connection of these new substances with the tetra- and heptanitroso compounds of Pawel and Marchlewski and Sachs is yet under investigation.

THE additions to the Zoological Society's Gardens during the past week include two Arabian Baboons (*Cynocephalus hamadryas*, ♂ ♀) from Somaliland, presented respectively by Mr. Francis G. Gunnis and Mrs. E. Lort Phillips; a Japanese Ape (*Macacus speciosus*, ♂) from Japan, presented by Dr. G. L. Johnston; a Rhesus Monkey (*Macacus rhesus*, ♂) from India, presented by Messrs. A. S. and E. Boatfield; a Naked-footed Owlet (*Athene noctua*), European, presented by Mr. Walter Chamberlain; a Black Tanager (*Tachyhonus melaleucus*) from Brazil, presented by Mr. Edward Hawkins; a Hawfinch (*Coccothraustes vulgaris*), British, presented by Mr. H. G. Devas; two Common Peafowl (*Pavo cristatus*, ♂ ♀) from India, presented by Mr. L. G. Whatman; two Pyrenean Newts (*Molge aspera*) from Lac d. Oncet, Pyrenes, presented by Dr. Jacques de Bedriaga; two Indian Pythons (*Python molurus*) from India, presented by Mr. G. Stephen; a Koodoo (*Strepsiceros kudu*, ♀) from Somaliland, a Kinkajou (*Cercoleptes caudivolvulus*, ♀), a Ring-tailed-Coati (*Nasua rufa*) from Brazil, a Dusky Bulbul (*Pycnonotus obscurus*) from Morocco, deposited; two Ruddy Sheldrakes (*Tadorna casarca*, ♂ ♀), European, a Red-fronted Amazon (*Chrysotis vittala*) from Porto Rico, a Yellow-fronted Amazon (*Chrysotis ochrocephala*) from Guiana, purchased; a Large Red Flying Squirrel (*Pteromys inornatus*) from India, received in exchange; two Japanese Deer (*Cervus sika*, ♂ ♀), a Barbary Sheep (*Ovis tragelaphus*, ♂), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

ALGOL.—The periodic variations in the intervals between the minima of Algol have been explained by Dr. Chandler by supposing that the bright star, with its eclipsing companion, revolves round a distant centre of gravity determined by its relation to another dark body. M. Tisserand, however, considers that the phenomena may be produced by the changes in the line of apsides due to a polar compression of Algol (NATURE, vol. li. p. 328). The latter hypothesis requires that considerable variations in the duration of the minima should be observed; while, on Dr. Chandler's hypothesis, there should be a periodic inequality of the proper motion of Algol. Prof. Lewis Boss has recently discussed the question from the point of view of the proper motion of the star; but since the coefficient is probably less than 0″·7, the investigation is a very delicate one. Taking the result of his computation, apart from any considerations of the behaviour of Algol as a variable star, Prof. Boss is of opinion that there is a preponderance of probability in favour of the real existence of a periodic element in the proper motion, such as is required by Dr. Chandler's hypothesis. Supposing them to be real, they indicate that the apparent motion is in an ellipse, the semi-axis major of which is 0″·522 ± 0″·103 and the semi-axis minor 0″·224; the position angle of the northern end of the major axis is 34°, and the inclination of the real orbit to our line of sight is 23°. The computation further indicates that the star passed the major axis of the apparent orbit within three or four years of the most probable date derived from the observated light-changes. Prof. Boss considers the evidence in favour of Dr. Chandler's hypothesis to be sufficient to justify a very thorough investigation of the meridian observations, as well as continued determinations of position. (*Astronomical Journal*, No. 343.)

PARALLAX AND ORBIT OF η CASSIOPEIÆ.—Twenty-seven photographs of the region round this star, taken by Dr. Rutherford

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more than twenty years ago, have been utilised by Mr. H. S. Davis for the determination of the parallax (*Astronomical Journal*, No. 343). Six pairs of comparison stars were employed, and the combined results give the value 0″·465 ± 0·044, corresponding approximately to a distance of η Cassiopeiæ from the earth of 43,113,000,000,000 miles, or 7⅓ light years. Though the new value exceeds previous ones, it is not considered improbably large if the Rutherford plates are subject to no systematic error. Using Grüber's values of the orbital elements, the combined masses of the components is two-tenths as great as that of the sun, and the distance between the components 19 astronomical units, the relative orbit thus being about the same size as that of Uranus. These numbers, however, may require some modification, as Dr. See has recomputed the elements of the orbit, with the results slightly differing from those adopted by Mr. Davis. Dr. See states that during the next ten years the position angle will increase from 204° to 251°, while the distance will diminish from 4″·52 to 3″·33.

A Belgian Astronomical Society.—A Société Belge d'Astronomy has been founded at Brussels. The object of the Society is to popularise astronomy and the sciences connected with it (geodesy, meteorology, terrestrial physics, &c.), and to encourage research into the domains of those branches of knowledge. The President of the Society is M. F. Jacobs, and among the Council are General Tilly, Prof. Dusausoy, Prof. Goemans, M. Lagrange, Prof. Pasquier, Prof. Rousseau, and M. Terby. Two of the Secretaries are M. Stroobaut and M. Vincent, both observers at the Royal Observatory, Brussels.

THE IRON AND STEEL INSTITUTE.

The annual spring meeting of the Iron and Steel Institute was held on Thursday and Friday of last week, in the theatre of the Society of Arts, under the chairmanship of the new President, Mr. David Dale. The following is the list of the papers set down for reading :—

"On Metal Mixers, as used at the Works of the North-Eastern Steel Company," by Mr. Arthur Cooper.

"On the Effect of Arsenic upon Steel," by Mr. J. E. Stead.

On the Iron Ore Mines of Elba," by Mr. H. Scott.

"On the Manufacture of Steel Projectiles in Russia," by Sergius Kern.

"On Ternary Alloys of Iron with Chromium, Molybdenum, and Tungsten," by James S. De Benneville, of Philadelphia.

The last two papers were taken as read. After the usual formal proceedings, the President presented the Bessemer medal, which had this year been awarded to Mr. H. M. Howe, of Boston, U.S.A. As Mr. Howe was not able to be present, Prof. Roberts-Austen accepted the medal on his behalf.

Mr. Dale next proceeded to read his inaugural address. Those who know the good work done by Mr. Dale in the conciliation of labour disputes will not be surprised to learn that the chief interest of the address was in the domain of economics rather than metallurgy. The address was none the less welcome on this account, as no class are more affected by disturbances in the labour market than the iron and steel makers. Mr. Dale showed very clearly the disastrous effects upon British trade of strikes and industrial disputes, and dwelt upon the ever-enlarging area of competition in the manufacturing markets of the world ; for now we have not only the continental nations of Europe to contend with, but have to meet the products of the still cheaper labour of the far East.

Mr. Cooper's paper, though short, supplied a valuable contribution of knowledge to the practical steel maker. Uniformity of product is at once one of the most desirable and most difficult things for the steel maker to secure. No matter what care may be taken, the product of the blast furnace will vary in regard to those minute percentages of alloys which exercise so important an influence on the characteristics of the steel producer. Efforts have been made to equalise the analysis of the pig iron by mixing the ore, but these have been only partially successful. It is desirable, from an economic point of view, that molten iron should be taken direct from the blast furnace and used in the converter ; but, in the basic process, the need of uniformity has prevented this course being followed. It has been therefore necessary to follow the original plan of running the molten iron from the blast furnace into pigs, and then remelting it in cupolas. In this way, by using the product of several furnaces, and by a system of careful analysing and selection, uniformity has been generally obtained. In spite of all care taken, however, there will be at times differences in the product of the cupolas, owing to irregularities in working which could not be guarded against, and it would frequently happen that though a standard mixture of pig might be charged into the cupola, the amount of silicon or manganese would vary considerably, owing to larger quantities of these metals being oxidised at one time than another. The mixer is a vessel in appearance like a large Bessemer converter. Into this the molten metal from the blast furnace is run, together with a certain amount of cupola iron in the case of the North Eastern Steel Company's works, with the plant of which the paper deals. The mixer is largely used in America, Mr. Carnegie stating during the discussion that at his works they were about to erect some of 600 tons capacity. The mixers, of which there are two at the North Eastern works, are each 150 tons capacity. For drawing the metal off into the ladle the mixer is tilted, swinging on trunnions like a converter, hydraulic machinery being provided for the purpose. In the discussion which followed the reading of the paper, many steel makers corroborated the account, given by the author, of the excellent results obtained by the use of the mixer.

The chief feature of the meeting was the reading and discussion of Mr. Stead's excellent contribution on the effect of arsenic in steel—a paper we should have described as exhaustive had it not been that the author states he is about to follow up the experiments of which he gives an account by further investigation in the same field. Mr. Stead commenced by a reference to the well-known memoir on the same subject, which Messrs. Harbord and Tucker contributed to the meeting of the Institute held in 1888. In that paper it was shown that a large quantity of arsenic is decidedly injurious to steel ; and it has generally been thought that smaller quantities would be similarly injurious in a corresponding degree. Mr. Stead did not consider such an hypothesis necessarily sound, and determined to carry out the elaborate series of experiments, details of which are given in the paper. The results, as we have said, are of the utmost importance to steel makers, for arsenic and phosphorus are frequently bracketed in analyses, as the separation of the two is a long and tedious process. If small quantities of arsenic are not injurious, as would appear from Mr. Stead's investigations, phosphorus is undeniably a deleterious ingredient.

The general conclusions the author drew from his investigations were that between 0·10 per cent. and 0·15 per cent. of arsenic in steel for structural purposes does not have any material effect so far as mechanical properties are concerned. The tenacity is but slightly increased, the elongation is apparently not affected, and the reduction in area of the fractured test-pieces is practically equal to that of the same steel without the addition of arsenic. With 0·20 per cent. arsenic the difference, although slight, is noticeable in samples of acid open-hearth steel tried ; but even in this case the only serious difference evidently caused by the arsenic is the inferiority of the bending properties of the pieces cut from the plates across the direction of rolling after they had been tempered. With larger amounts of arsenic the effect is decisive. When 1 per cent. is present the tenacity is increased, and the elongation slightly reduced. The bending properties of the steel are, however, fairly good. When the arsenic amounts to about 1½ per cent. the tenacity is still further increased, and the elongation and contraction of area still further reduced, whilst the bending properties are poor. With 4 per cent. of arsenic the tenacity is increased, and the contraction becomes *nil*. The author points out, however, that the trials with steel containing the higher percentages of arsenic could not be considered quite satisfactory, because the ingots on which the experiments were made were of very small size, and consequently a small amount of work only could be put upon them before testing. Mr. Stead considered it would have been highly probable that had larger masses been dealt with the results would have been more satisfactory. The effect of quenching the steel, after heating to a red heat, in every case where arsenic was in large quantity, was to improve its bending property.

Hot working is not affected by even 4 per cent. of arsenic, such an alloy appearing to stand about as much heat without burning as a steel containing 1 per cent. of carbon. When heated below the burning point such material can readily be hammered and rolled, and appears to be as soft in that state as steel containing about ·05 per cent. carbon. From this the author considers it safe to conclude that arsenic has not the slightest tendency to produce red-shortness. Mr. Stead had

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